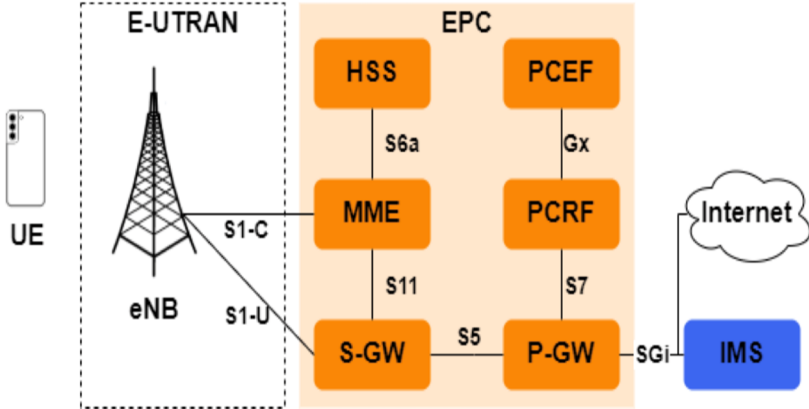



EXHIBIT 12

U.S. Patent No. 7,599,379

Claim 7	Identification
<p>[7pre] A wireless architecture, comprising:</p>	<p>To the extent the preamble is limiting, the OnePlus 9 provides a wireless architecture.</p> <p>For example, a OnePlus 9 (“UE”) provides VoLTE (Voice over LTE) services on a 4G Long Term Evolution (LTE) network and a 5G New Radio (NR) network .</p>  <p>The diagram illustrates the High-level LTE Architecture. It shows a User Equipment (UE) connected to an eNodeB (eNB) within the E-UTRAN. The eNB is connected to the EPC (Evolved Packet Core) via S1-C and S1-U interfaces. The EPC contains several components: HSS (Home Subscriber System), MME (Mobility Management Entity), S-GW (Serving Gateway), PCEF (Policy and Charging Enforcement Function), PCRF (Policy and Charging Rules Function), and P-GW (PDN Gateway). The HSS is connected to the MME via S6a. The MME is connected to the S-GW via S11. The S-GW is connected to the P-GW via S5. The P-GW is connected to the PCRF via S7. The PCRF is connected to the PCEF via Gx. The P-GW is connected to the Internet via SGI. The Internet is connected to the IMS (IP Multimedia Subsystem) via SGI. The IMS is represented by a blue box.</p> <p>Fig. 1: High-level LTE Architecture</p>

Claim 7	Identification
	<div data-bbox="793 289 1591 682" data-label="Diagram"> <p>The diagram illustrates the high-level 5G Core network architecture. On the left, a User Equipment (UE) is connected to the 5G RAN (Radio Access Network), which includes a gNB (gNodeB). The 5G RAN is connected to the 5GC (5G Core) via the N2 and N3 interfaces. The 5GC is represented by a green shaded area containing several network functions: AMF (Access and Mobility Management Function), PCF (Policy Control Function), SMF (Session Management Function), UDM (Unified Data Management), and UPF (User Plane Function). The AMF is connected to the PCF via N15, to the SMF via N11, and to the UDM via N8. The SMF is connected to the UDM via N10 and to the UPF via N4. The UDM is connected to the UPF via N7. The UPF is connected to the IMS (IP Multimedia Subsystem) via N6. The IMS is connected to the Internet (represented by a cloud icon). The Internet is also connected to the UDM via N7.</p> </div> <p data-bbox="982 701 1386 738">Fig. 2: High-level 5G Core</p> <p data-bbox="766 779 1978 885">Source: Analysis of Power consumption in 4G VoLTE and 5G VoNR over IMS network, 2022 IEEE 27th International Workshop on Computer Aided Modeling and Design of Communication Links and Networks (CAMAD).</p>

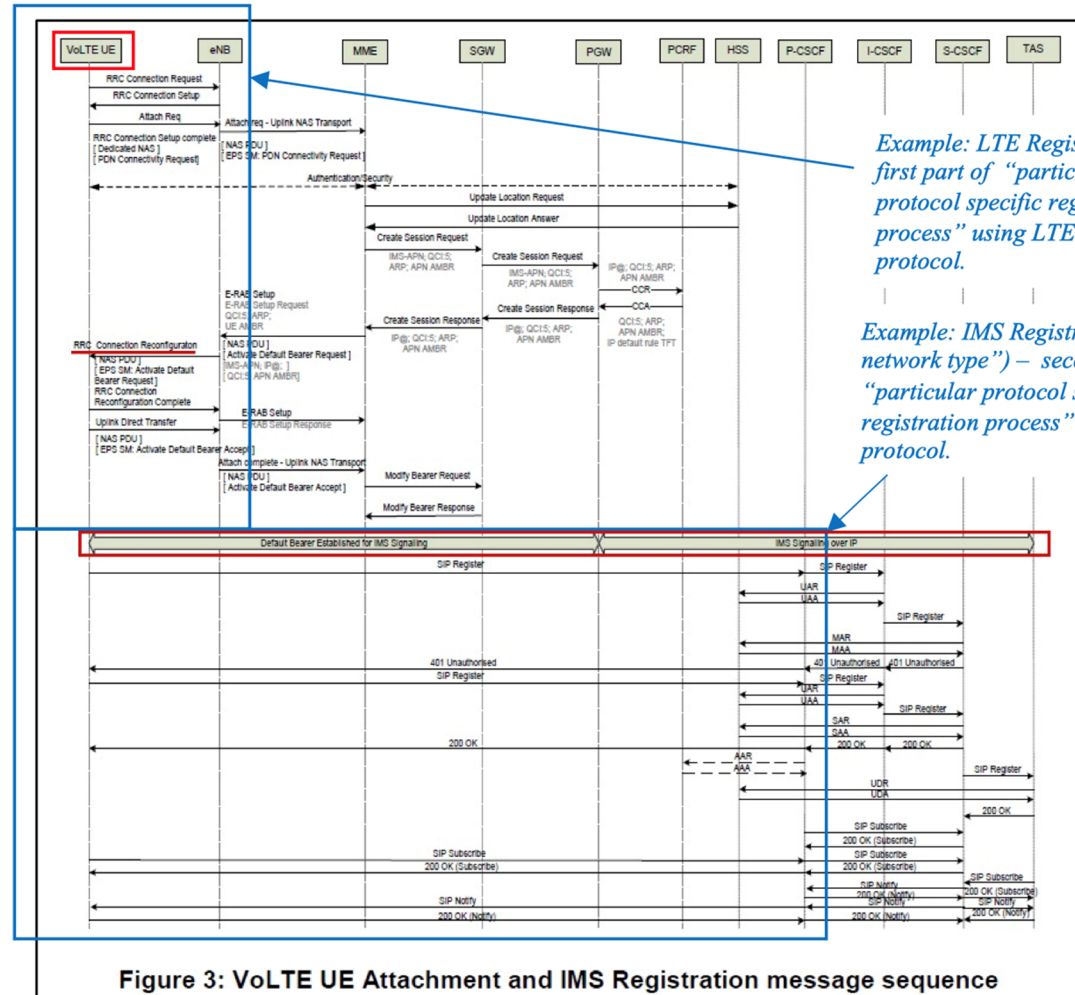
Claim 7	Identification
	<p data-bbox="993 289 1178 337">OnePlus 9</p> 

Claim 7	Identification
	<div data-bbox="772 261 1894 664"> <div> <div>Connectivity</div> <div>LTE/LTE-A</div> <div>4x4 MIMO, Supports up to DL Cat 20/UL Cat 18 (2 Gbps /200Mbps), depending on carrier support</div> </div> <div> <div>Band</div> <div> GSM: B2, 3, 5, 8 WCDMA: B1, 2, 4, 5, 8, 9, 19 CDMA: BC0, BC1, BC10 LTE-FDD: B1, 2, 3, 4, 5, 7, 8, 12, 13, 17, 18, 19, 20, 25, 26, 28, 30, 32, 66, 71 LTE-TDD: B38, 39, 40, 41, 46, 48 5G NSA: N1, 2, 3, 5, 7, 8, 20, 25, 28, 38, 40, 41, 48, 66, 71, 77, 78 5G SA: N1, 2, 3, 5, 7, 25, 28, 41, 48, 66, 71, 77, 78 MIMO: LTE: B1, 2, 4, 7, 25, 38, 66, 41, 48; NR: N1, 2, 7, 25, 38, 41, 48, 66, 77, 78 </div> </div> </div> <div data-bbox="772 690 1234 727"> https://www.oneplus.com/us/9/specs </div> <div data-bbox="772 748 1854 1393"> <p>WIRELESS BUSINESS PREPAID TV BANKING INTERNET</p> <p>T Plans ▾ Phones & devices ▾ Deals ▾ Coverage ▾ Join Us ▾ My account ▾</p> <p>Phones > OnePlus > 9 5G</p> <p>ONEPLUS</p> <p>9 5G</p> <p>★ 3.3 (189)</p> <p>Starting at \$18.75/mo. for 24 mos. with \$0 down</p> <p>Never Settle</p> <p>MEMORY</p> <p>128GB</p> <p>COLOR : Winter Mist</p> </div>

Claim 7	Identification
	https://www.t-mobile.com/cell-phone/oneplus-9-5g
[7a] a first network type operable to communicate with a station; and	<p>A wireless architecture comprises a first network type operable to communicate with a station, for example, a UE.</p> <p>An example of a “first network type” is VoLTE cellular network (4G and/or 5G).</p>
[7b] an interoperability node operable on the architecture to:	<p>An interoperability node is operable on the architecture.</p> <p>For example, hardware/software on the OnePlus 9 (UE) comprises an interoperability node and is operable on the architecture as shown previously.</p>
[7c] communicate with multiple different network protocols;	<p>The interoperability node communicates with multiple different network protocols.</p> <p>The UE communicates with 3GPP LTE 4G and/or 5G protocol (one example of a network protocol) and with the Session Initiation Protocol (SIP) (another example of a different network protocol) on the IMS network.</p>
[7d] consolidate the registration process on multiple different network protocols; and	<p>The interoperability node consolidates the registration process on multiple different network protocols.</p> <p>The UE consolidates the registration process on multiple different network protocols, for example, with 3GPP LTE 4G and/or 5G protocol (one example of a network protocol) and with the Session Initiation Protocol (SIP) (another example of a different network protocol) on the IMS network.</p>

Claim 7

Identification



Source: <https://www.gsma.com/futurenetworks/wp-content/uploads/2014/10/FCM.01-VoLTE-Service-Description-and-Implementation-Guidelines-Version-2.0.pdf>

Claim 7	Identification
	<p>“3.2.1 VoLTE UE Attachment and IMS Registration</p> <p>3.2.1.1 General</p> <p>A VoLTE UE, under LTE coverage, shall automatically perform an LTE Attach followed by an IMS registration for VoLTE, if the network supports VoLTE (for further details on the conditions for IMS registration see section 2.2.1 of GSMA IR.92 [54]). This ensures that the VoLTE UE shall be available for VoLTE services (i.e. incoming calls, outgoing calls and supplementary services), similar to the voice experience in today's CS network deployments.”</p> <p>Source: https://www.gsma.com/futurenetworks/wp-content/uploads/2014/10/FCM.01-VoLTE-Service-Description-and-Implementation-Guidelines-Version-2.0.pdf</p> <p>“3.2.1.3 Detailed Description VoLTE UE Attach</p> <p>....</p> <p>The MME sends an Attach Accept to the eNodeB with the IMS-APN, IP Address for the UE, QoS parameters, PCO, IMS Voice over PS supported indication, TAI list, ESM message container, etc. The eNodeB communicates with the UE to update the RRC configuration and includes the information received from the core network as part of the create session request.</p> <p>The UE sends the Attach Complete message to the eNodeB, which forwards to the MME. At this time, the UE is capable of sending uplink packets. The MME initiates a Modify Bearer Request to the SGW including the EPS Bearer Identity, eNodeB address, and eNodeB TEID. The SGW acknowledges the request to the MME and is capable of sending downlink packets.</p> <p>At this stage, the VoLTE UE is attached to the network via a default bearer that is established for IMS Signalling.”</p> <p>Source: https://www.gsma.com/futurenetworks/wp-content/uploads/2014/10/FCM.01-VoLTE-Service-Description-and-Implementation-Guidelines-Version-2.0.pdf</p> <p>“7.2.1 IMS registration via CS access</p> <p>7.2.1.1 Overview</p>

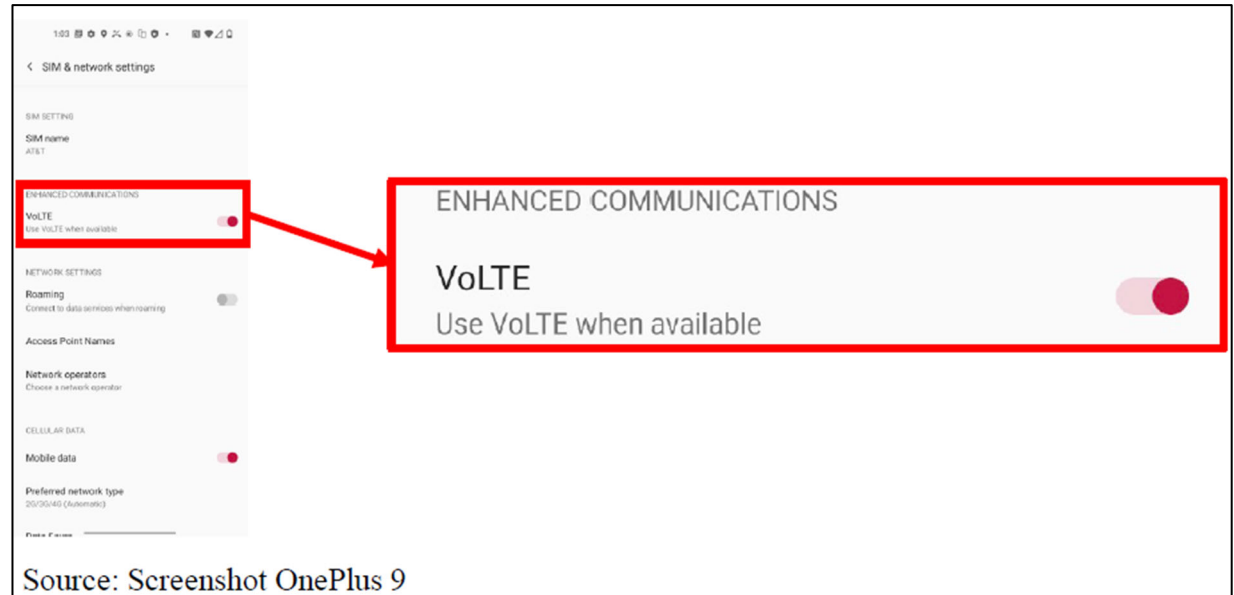
Claim 7	Identification
	<p>If the MSC Server enhanced for ICS implements the Combined CS Access Authentication procedure as specified in Annex G, the UE accessing the network via CS domain shall be authenticated and registered by this procedure, otherwise the following applies. The UE may register (attach) in the CS domain whenever in CS coverage. The existing mobility management mechanisms are used in the UE and the CS network. When performing a successful Location Update for the UE, the MSC Server has received the subscriber data from the HSS/HLR. This subscriber data may include an optional flag per VPLMN.”</p> <p><i>See 3GPP TS 23.292 V.16.0.0 at pp. 22-24.</i></p> <p>When a UE obtains connectivity from an LTE network, the IMS registration process is described in Section 5.2.2.3 of 3GPP TS 23.228.</p> <p>“5.2.2.3 Registration information flow – User not registered The application level registration can be initiated after the registration to the access is performed, and after IP connectivity for the signalling has been gained from the access network. For the purpose of the registration information flows, the user is considered to be always roaming. For user roaming in their home network, the home network shall perform the role of the visited network elements and the home network elements.</p> <p>Figure 5.1: Registration – User not registered</p> <ol style="list-style-type: none"> 1. After the UE has obtained IP connectivity, it can perform the IM registration. To do so, the UE sends the Register information flow to the proxy (Public User Identity, Private User Identity, home network domain name, UE IP address, Instance Identifier, GRUU Support Indication). ...” <p><i>See 3GPP TS 23.228 V.16.0.0 at pp. 75-76.</i></p>
[7e] register a station in one or more other network types by:	<p>The interoperability node registers a station in one or more other network types:</p> <ul style="list-style-type: none"> • Example of a “first network type”: VoLTE cellular network (4G and/or 5G)

Claim 7	Identification
	<ul style="list-style-type: none"><li data-bbox="814 264 1743 297">• Example of “other network types”: IP Multimedia Subsystem (IMS). <p data-bbox="766 337 1927 370">As discussed in [7d] above the interoperability node in the UE registers the UE in the IMS.</p>

[7f] identifying a particular protocol specific registration process from a number of protocol specific registration processes;

The interoperability node identifies a particular protocol specific registration process from a number of protocol specific registration processes.

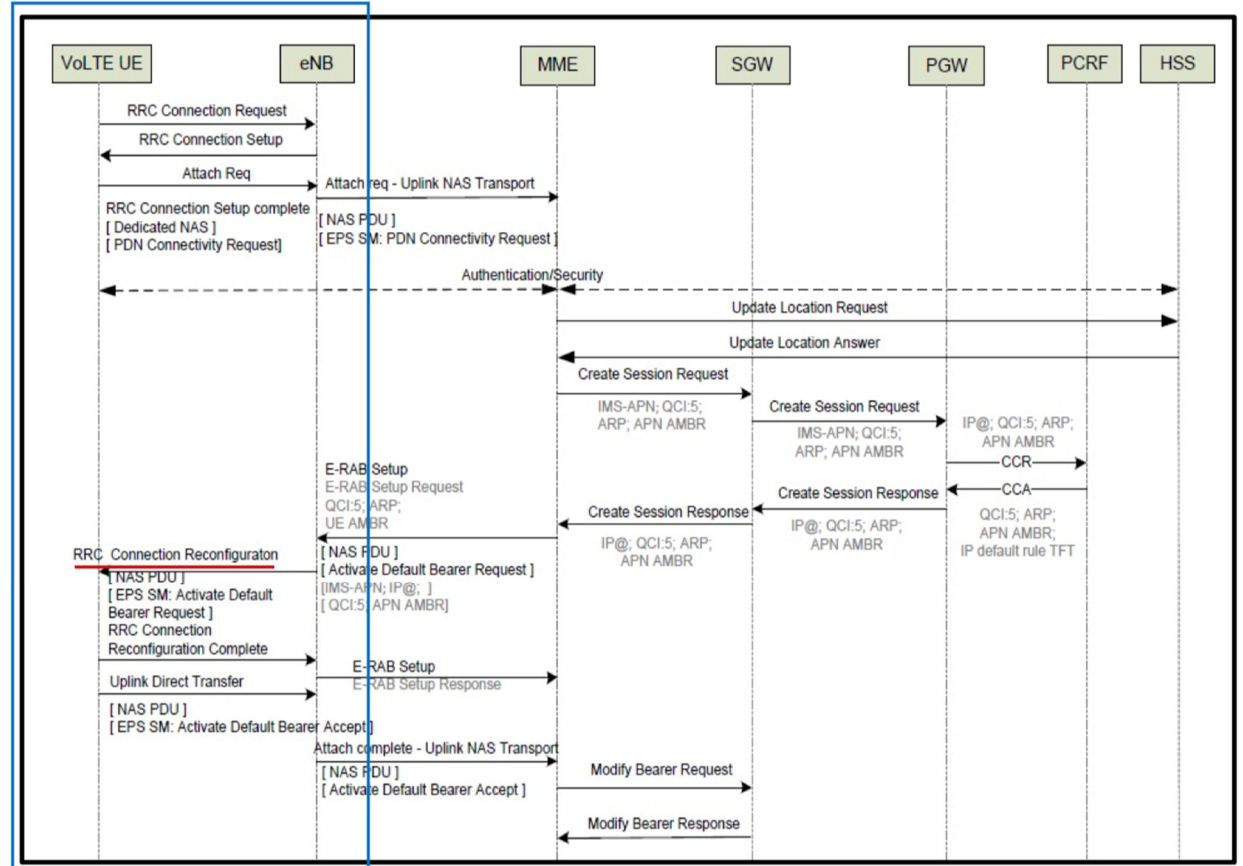
As discussed in [7d] above, the protocol specific registration processes depend on the type of access that the station has.



Claim 7	Identification
<p>[7g] utilizing the particular protocol specific registration process to directly access information from a network being signaled;</p>	<p>The interoperability node utilizes the particular protocol specific registration process to directly access information from a network being signaled.</p> <p>An example of “utilizing the particular protocol specific registration process”: VoLTE UE (interoperability node) registers with the cellular network using LTE wireless network protocol messages. As part of this process the core network establishes a default bearer configuration to be used (by the VoLTE UE) for IMS SIP over IP signaling. The eNodeB sends default bearer details to the VoLTE UE (RRC Connection Reconfiguration). The VoLTE UE then activates the bearer.</p>

Claim 7

Identification



Source: <https://www.gsma.com/futurenetworks/wp-content/uploads/2014/10/FCM.01-VoLTE-Service-Description-and-Implementation-Guidelines-Version-2.0.pdf>, Figure 3

“The MME sends an Attach Accept to the eNodeB with the IMS-APN, IP Address for the UE, QoS parameters, PCO, IMS Voice over PS supported indication, TAI list, ESM message

Claim 7	Identification
	<p>container, etc. The eNodeB communicates with the UE to update the RRC configuration and includes the information received from the core network as part of the create session request.</p> <p>The UE sends the Attach Complete message to the eNodeB, which forwards to the MME. At this time, the UE is capable of sending uplink packets. The MME initiates a Modify Bearer Request to the SGW including the EPS Bearer Identity, eNodeB address, and eNodeB TEID. The SGW acknowledges the request to the MME and is capable of sending downlink packets.</p> <p>At this stage, the Vol TE UE is attached established for IMS Signalling.”</p> <p>Source: https://www.gsma.com/futurenetworks/wp-content/uploads/2014/10/FCM.01-VoLTE-Service-Description-and-Implementation-Guidelines-Version-2.0.pdf, Section 3.2.1.3</p>
[7h] and completing the particular protocol specific registration process based upon the accessed information.	<p>The interoperability node completes the particular protocol specific registration process based upon the accessed information.</p> <p>An example of “completing the particular protocol specific registration process”: The VoLTE UE carries out IMS registration (“other network type”) using the IP data bearer activated using the “accessed information”. The data bearer is used to carry SIP Register, 200 OK and other SIP protocol messages between the UE (the interoperability node) and the IMS network P-CSCF.</p>

